AF/2815

#17/A/B 4/28/3 Sinha

Docket No.: 2000 P 4162

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By: _____ Date: April 11, 2003

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Before the Board of Patent Appeals and Interferences

Applicant : Knut Kahlisch et al.

Applic. No. : 09/901,550

Filed : July 9, 2001

Title : Support Matrix with Bonding Channel for Integrated Semiconductors, and Method for Producing it

Examiner : Chris C. Chu - Art Unit: 2815

BRIEF ON APPEAL

Hon. Commissioner of Patents and Trademarks,
Washington, D. C. 20231,

S i r :

This is an appeal from the final rejection in the Office action dated November 25, 2002, finally rejecting claims 1-7 and 11.

Appellants submit this *Brief on Appeal* in triplicate, including payment in the amount of $320.00 to cover the fee for filing the *Brief on Appeal*.

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Real Party in Interest:

This application is assigned to Infineon Technologies AG of München, Germany. The assignment will be submitted for recordation upon the termination of this appeal.

Related Appeals and Interferences:

No related appeals or interference proceedings are currently pending which would directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

Status of Claims:

Claims 1-7 and 11 are rejected and are under appeal. No claims were cancelled. Method claims 8-10 are withdrawn from further consideration.

Status of Amendments:

Claims 1 and 6 were amended after the final Office action. *An amendment under 37 CFR § 1.116* was filed on March 4, 2003. The Primary Examiner stated in an *Advisory Action* dated March 24, 2003, that the amendment after final would be entered upon the filing of a *Notice of Appeal*.

Summary of the Invention:

As stated in the first paragraph on page 1 of the specification of the instant application, the invention

relates to a support matrix with a bonding channel for integrated semiconductors having a barrier at the bonding channel, and to a method for producing such a support matrix.

Appellants explained on page 11 of the specification, line 6, that, in all the figures of the drawing, sub-features and integral parts that correspond to one another bear the same reference symbol in each case. Referring now to the figures of the drawing in detail and first, particularly, to Fig. 1 thereof, there is shown, in plan view, a region of a support matrix 1 as an exemplary embodiment of the present invention. Conductor track structures are formed on a frame 2, the conductor track structures contain conductor tracks 3 and external contact pads 4 for contact-connecting a housing to circuits, for example on circuit boards. Bonding leads 5 are concentrated in a bonding channel 6. They contain an anchor, a mating anchor and a central, actual bonding region for connecting a bonding lead 5 to the semiconductor chip.

It is further stated on page 11 of the specification, line 20, that barriers 7, 8 according to the invention are disposed along the bonding channel 6 at its edge. As is evident from Fig. 2, they run over the entire long side of the bonding channel 6 illustrated and hence over the conductor track structures 3 and the actual frame 2.

Appellants outlined on page 12 of the specification, line 1, that Fig. 2 is a cross section through the support matrix of Fig. 1 along the section line II-II. The barriers 7 and 8 running along the edge of the bonding channel 6 are shown as grooves 7, 8 here. It goes without saying, however, that they can likewise be a different embodiment of the present invention.

It is also outlined on page 12 of the specification, line 7, that the barrier 7, 8 may have a region with a parting agent 10 disposed thereon which repels the flowable material. In this case, then, an adhesiveness of the flowable material on the frame is altered by the use of the coating 10 in such a way that it is unable to creep over the coated region onto the region to be protected.

Appellants described in the last paragraph of the specification, starting at line 14 on page 12, that one method of forming the grooves 7, 8, requires the application of a resist mask 11 over the frame 2 and then a latter etching process for forming the grooves 7, 8. Another method of forming the grooves 7, 8 is to emboss them in at least one of the frame 2, the conductor track structures 3, and the bonding leads 5.

References Cited:

U.S. Patent No. 4,562,092 (Wiech, Jr.), dated December 31, 1985;

U.S. Patent No. 4,599,636 (Roberts et al.), dated July 8, 1986.

Issues

1. Whether or not claims 1-3, 5-7 and 11 are anticipated by Wiech, Jr. under 35 U.S.C. §102(b).

2. Whether or not claim 4 is obvious over Wiech, Jr. in view of Roberts et al. under 35 U.S.C. §103.

Grouping of Claims:

Claims 1, 6 and 11 are independent. Claims 2-5 depend on claim 1. Claim 7 depends on claim 6. The patentability of claims 1, 6 and 11 are separately argued. Therefore, claims 2-5 stand or fall with claim 1 and claim 7 stands or falls with claim 6.

Arguments:

In item 6 on pages 3-5 of the above-mentioned final Office action, claims 1-3, 5-7 and 11 have been rejected as being anticipated by Wiech, Jr. under 35 U.S.C. § 102(b).

Before discussing the prior art in detail, it is believed that a brief review of the invention as claimed, would be helpful.

Claims 1, 6 and 11 call for, inter alia:

> the barrier having a region with a parting agent disposed thereon for repelling the flowable material.

Wiech, Jr. discloses a support matrix in Figs. 1 and 2. According to the Examiner, these figures show a bonding channel 30. However, a bonding channel is an opening in a frame that allows access to bonding leads or to wiring from a side remote from a semiconductor chip (see page 2, lines 16-19 of the specification of the instant application). As can be clearly seen from Figs. 1, 3 and 4 of the instant application, bonding leads or wires (5) are disposed in the bonding channel (6). It is questionable if the recess 30 of Fig. 2 of Wiech, Jr. is a bonding channel because the most obvious purpose of the recess 30 is to receive a semiconductor chip 2. Although there are wires 3 and 4, they are on the upper side of the semiconductor chip 2 and the height of these bond contacts is above the recess. Clearly, the wires 3 and 4 in Wiech, Jr. are not disposed in the recess 30, but rather disposed above the recess 30.

The Examiner has also stated that Wiech, Jr. discloses a groove 10 functioning as a barrier for preventing a flow of a flowable material from the bonding channel onto conductor track structures 18. Although there are conductors 18 to 21 allocated at a larger distance from recess 30 than grooves 10 to 14, Appellants believe that Wiech, Jr. does not disclose that the grooves 10 to 14 serve as a barrier for flowable material. In contrast, according to column 5, lines 30 to 35 of Wiech, Jr., the grooves 10 to 14 serve to receive a bonding tool that welds a wire 3 to a conductive material 24 at the bottom of the grooves. The conductive material 24 at the bottom of the grooves 10 to 14 is illustrated in Fig. 1 of Wiech, Jr. It seems that the conductive material 24 forms conductors or conductor track structures of the same kind as the conductor 18 referred to by the Examiner. Furthermore, in column 5, lines 41 to 45 of Wiech, Jr., it is disclosed that the grooves serve to obviate the need for insulating the conductors 24 within the grooves when positioning further conductors like bonding wires 3 crossing the grooves. The grooves receiving the conductors 24 prevent electrical short circuit of the conductors 24 with wires 3. Regarding the purpose of grooves 10 to 14, the Examiner has referred to column 10, lines 42 to 46 of Wiech, Jr., where actually only a spraying of epoxy resin onto the semiconductor chip 2 is disclosed. If the grooves 10 to 14 would serve to prevent an

epoxy resin flow, they would not contain the conductors 24 because contact of epoxy resin with the conductor 24 would be facilitated rather than prevented.

The Examiner has further asserted that the reference sign 24 in Fig. 2 of Wiech, Jr. denotes a parting agent (see the fourth paragraph on page 4 of the final Office action). However, this assumption is in contradiction to the text in column 5, lines 34, 43 and 49 of Wiech, Jr., explicitly teaching that reference sign 24 denotes a conductive material, namely a metal line formed in the groove. As already explained above, the conductive material 24 forms conductors rather than a parting agent.

Wiech, Jr. also does not suggest or provide any hint to use a groove filled with a parting agent for repelling a flowable material. The Examiner's interpretation contradicts the teaching of Wiech, Jr. For instance, Wiech, Jr. discloses in column 5, lines 38-45 that the grooves serve to obviate the need of electrically insulating the wire 3 and the conductive lines 24 from each other (see Fig. 2). The grooves only serve to provide a distance between the conductive lines 24 and the wire 3 crossing each other. Wiech, Jr. does not teach preventing any flowable material from creeping along the support matrix.

The flowble material mentioned in column 10, lines 44-46 of Wiech, Jr. in no way refers to preventing a lateral material flow along the support matrix surface. In contrast, it is explicitly disclosed in Wiech, Jr. that the substrate can be encapsulated, meaning that the substrate is completely covered with the encapsulating material thereby isolating the substrate from any environmental influences (like moisture, for instance). The object of completely encapsulating a substrate from the environment and the object of selectively covering a portion of a substrate with a flowable material without covering other portions of the same substrate contradict each other. In Wiech, Jr., encapsulating the substrate of Fig. 2 means that the whole surface of the support matrix, including the grooves 10-14, will be covered with the encapsulating material. It is, therefore, not necessary in Wiech, Jr. to prevent the flowable material from flowing along the support matrix surface.

Clearly, Wiech, Jr. does not show the barrier having a region with a parting agent disposed thereon for repelling the flowable material, as recited in claims 1, 6 and 11 of the instant application.

Claims 1, 6 and 11 are, therefore, believed to be patentable over Wiech, Jr. and since claims 2-3, 5 and 7 are dependent on claims 1 or 6, they are believed to be patentable as well.

In item 8 on page 6 of the above-mentioned final Office action, claim 4 has been rejected as being unpatentable over Wiech, Jr. in view of Roberts et al. under 35 U.S.C. § 103(a).

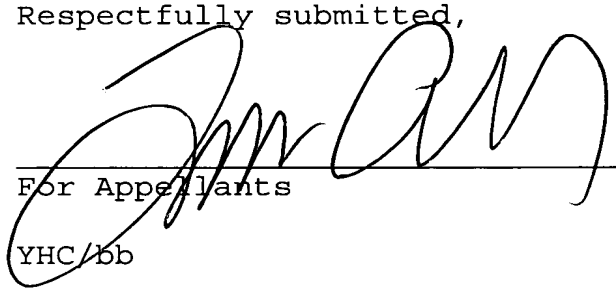
As discussed above, claim 1 is believed to be patentable over the art. Since claim 4 is dependent on claim 1, it is believed to be patentable as well.

In addition, Roberts et al. also do not disclose any parting agent repelling a flowable material. According to column 8, lines 21-22 of Roberts et al., silicon is used as an encapsulation material, which is intended to completely isolate the substrate from environmental influences, rather than to achieve a selective application of an encapsulation material.

In view of the above, the honorable Board is therefore

respectfully urged to reverse the final rejection of the Primary Examiner.

Respectfully submitted,



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Appendix - Appealed Claims:

1. A support matrix for integrated semiconductors, comprising:

a frame having at least one bonding channel with an edge formed therein, said frame further having a groove formed therein along said edge of said bonding channel;

conductor track structures disposed on said frame, said groove formed in said frame functioning as a barrier for preventing a flow of a flowable material from said bonding channel onto said frame and onto said conductor track structures, said barrier having a region with a parting agent disposed thereon for repelling the flowable material; and

contacts, selected from the group consisting of bonding leads and wires, connected to said conductor track structures and disposed in said bonding channel, said contacts used for connecting said conductor track structures to an integrated circuit.

2. The support matrix according to claim 1, wherein said barrier is disposed on all sides of said bonding channel and completely surrounds said bonding channel.

3. The support matrix according to claim 1, wherein said frame has a surface remote from said bonding leads and said barrier is formed in said surface of said frame which is remote from said bonding leads.

4. The support matrix according to claim 1, wherein the flowable material is silicone for forming structures on the support matrix.

5. The support matrix according to claim 1, wherein said barrier has a region with a parting agent disposed thereon for repelling the flowable material.

6. A support matrix for integrated semiconductors, comprising:

a frame having at least one bonding channel with an edge formed therein;

conductor track structures disposed on said frame, said frame and said conductor track structures having a groove formed therein along said edge of said bonding channel, said groove functioning as a barrier for preventing a flow of a flowable material from said bonding channel onto said frame and onto said conductor track structures, said barrier having a region

with a parting agent disposed thereon for repelling the flowable material; and

contacts, selected from the group consisting of bonding leads and wires, connected to said conductor track structures and disposed in said bonding channel, said contacts used for connecting said conductor track structures to an integrated circuit.

7. The support matrix according to claim 6, wherein said groove is formed to extend into said bonding leads.

Claim 11. A support matrix for integrated semiconductors, comprising:

a frame having at least one bonding channel with an edge formed therein;

conductor track structures disposed on said frame;

contacts, selected from the group consisting of bonding leads and wires, connected to said conductor track structures and disposed in said bonding channel, said contacts used for connecting said conductor track structures to an integrated circuit; and

a barrier formed along said edge, said barrier having a parting agent disposed thereon for repelling a flowable material from said bonding channel onto said frame and onto said conductor track structures.